Cobalt Mining Pros and Cons

This activity addresses the following essential understanding:

- There are tradeoffs involved in mining minerals in the U.S. and relying on imports of minerals.

Time Estimate: 45 minutes

Overview

In this activity, students consider diverse perspectives on the question of whether to mine cobalt domestically. They develop and share a list of talking points about whether cobalt should be mined in the U.S.

This is the second of three activities that introduce students to minerals development on public lands.

Teacher Preparation

1. Read the "Background Information" from the U.S. Geological Survey Minerals Resource Program
2. Make enough copies of the "Talking Points" and "Background Information" handouts for each student.

Learning Objectives

Students will be able to (1) describe how cobalt is used in numerous consumer products, and (2) explain the benefits and costs of mining cobalt domestically.

Procedure

1. Introduce the lesson: Explain that students will be looking at whether cobalt should be mined in the U.S. based on the perspective of a group to which they are assigned and a consideration of other viewpoints.
2. Form groups: Have students count off 1 through 10 and distribute the Talking Points handout to each student. Review the instructions and have all groups select a presenter.
3. Create talking points: Circulate among the groups and provide assistance as necessary while they discuss the questions on the handout and create their 2-minute talking points for their organization's president.
4. Present talking points: Provide each group 2 minutes to share their talking points. Encourage everyone else in the class to write down questions and suggestions for the presenters. After each presentation, invite students to ask their questions or share their suggestions.
5. Summarize the cobalt mining discussion: Conclude the class by asking students about:
    - Whether domestic cobalt mining would be good for US businesses, and why.
    - Whether domestic cobalt mining would be good for the environment, and why.
    - Whether domestic cobalt mining would be good for nearby tourism businesses, and why.

Assessment

The talking points should address each bullet in the handout. As they share their talking points, be sure students describe and support their viewpoint, mention who might oppose them and why, and conclude with a clear message.

Talking Points Handout

You are the media preparation team for one of the 10 organizations below, based on your group number.

Group 1: a maker of space rocket boosters
Group 2: a utility that wants to build a gas-powered electricity facility
Group 3: a maker of hybrid cars and trucks
Group 4: a maker of cell phones
Group 5: a maker of computers
Group 6: a county economic development office where the cobalt mine would be developed
Group 7: a homeowner's association near the proposed mine, which supplies homes with well water
Group 8: a company that takes tourists on fishing trips near the proposed mine
Group 9: a company that takes tourists on rafting trips near the proposed mine
Group 10: an organization that promotes conservation of animal habitat

Great news! Your organization's president has been invited to appear on TV's top rated news show to talk about a proposed new cobalt mine. She needs your team to give her 2 minutes worth of TV talking points on these questions:

- What is our organization's position on whether a cobalt mine is needed in the U.S., yes or no?
- What are our 2 strongest reasons?
- Which one of the other groups is most likely to disagree with our position?
- What is a reason they would likely give for disagreeing with us?
- How should we answer them?
- Conclusion: what's the single most important point the TV viewer should take away from watching our organization's president?

To get started, read the material below and discuss questions 1-5. Then develop a 2-minute talking points document for your organization's leader to prepare her to appear on the TV news show.

Questions to discuss:

1. How do businesses use the "superalloys" that cobalt is used to make?
2. What are two uses for cobalt that help the environment?
3. What feature of cobalt makes it useful as part of the magnets used in computer disc drives and electric motors?
4. How much cobalt is mined in the United States?
5. Why might global supplies of cobalt become threatened?

Background Information, from the USGS Minerals Resource Program

(https://pubs.usgs.gov/fs/2011/3081/pdf/fs2011-3081.pdf)

Cobalt is a shiny, gray, brittle metal that is best known for creating an intense blue color in glass and paints. It is frequently used in the manufacture of rechargeable batteries and to create alloys that maintain their strength at high temperatures. Cobalt is an important component in many aerospace, defense, and medical applications and is a key element in many clean energy technologies.

The Swedish chemist Georg Brandt isolated metallic cobalt—the first new metal to be discovered since ancient times—in about 1735 and identified some of its valuable properties.

[Much of the cobalt used in the U.S. helps make] superalloys, which are corrosion-resistant alloys that retain their strength at very high temperatures. [An alloy is a metal made when two or more metallic elements are combined.] Gas turbine engines and other components used in aircraft and space vehicles, chemical and petroleum plants, and powerplants depend on the high-temperature strength of superalloys. Cobalt also has impressive magnetic properties that it retains at temperatures as high as 1,121 °C. Cobalt is an important component of the magnets used in computer disc drives and in electric motors; it helps them operate more efficiently at a wide range of temperatures.

Globally, the leading use of cobalt is in rechargeable batteries to help increase battery life and stability and to reduce corrosion. Mobile phones, portable computers, and hybrid and electric vehicles all depend on the energy produced by chemical reactions in these rechargeable batteries.

Cobalt is not a rare element even though pure cobalt is not found in nature…. Most cobalt is produced as a byproduct of the processing of copper and nickel ores. Cobalt is obtained from … ore deposits, [including] sediment-hosted stratiform copper deposits, such as those in the central African copper belt in the Democratic Republic of the Congo (DRC)….

Although [very small] amounts of cobalt were mined in the United States in 2010, construction of a new cobalt mine about 40 miles from Salmon, Idaho, [is likely to produce 1,500 tons, or 2% of world output, of cobalt per year starting in 2019 or 2020]. Almost one-half the world's known reserves of cobalt—some 3.4 million metric tons—are located in the DRC.

The supply of cobalt is at risk of disruption for the following reasons: the global market is relatively small; there are limited sources of production; and, because most cobalt is a byproduct of copper or nickel mining, the supply is dependent on the markets for these more abundant metals.

Websites

https://www.encyclopedia.com/places/united-states-and-canada/canadian-political-geography/cobalt

https://www.idahostatesman.com/news/local/news-columns-blogs/letters-from-the-west/article205031074.html